

1. Biopsy device for taking tissue samples, consisting of a hand piece, in which a hollow biopsy needle is inserted, wherein one part of the part of the biopsy needle that protrudes beyond the hand piece is introduced with its sample removal chamber into the tissue being studied and the tissue is sucked into the sample removal chamber by vacuum and then separated by means of a sample separation mechanism and afterwards removed, characterized in that the tension slide is brought into a cocked position by means of electric motor power against the action of a spring, the needle unit is arranged on the tension slide mounted in the hand piece, and the sample removal chamber is shot into the tissue after releasing the cocked tension slide, the vacuum pressure-generating device (5) as well as other control and supply devices are integrated in the housing of the hand piece (1), and the connection element (4) between the biopsy needle (3) and the vacuum pressure-generating unit (5) is arranged directly on the housing, the vacuum pressure-generating device (5) consists of a controllable piston/cylinder unit (69), which has a ventilation opening (67), so that excess pressure can be produced in the vacuum pressure-generating device for ejection of the sample, all actuators are electrically operated and the actuator for the tension slide is also used as actuator of the cutting sheath, the hollow biopsy needle is surrounded by an outer coaxial cutting sheath, and a board for activating the electronics is arranged on the front side of the housing, in which the tension slide release is integrated.
2. Biopsy device per claim 1, characterized in that the vacuum pressure-generating device (5) is a syringe/plunger unit having a ventilation opening (67) in the upper part, which is opened to dissipate the vacuum by retraction of the syringe plunger (54).
3. Biopsy device per claim 1 and 2, characterized in that the plunger (54) of the vacuum pressure-generating device (5) can move in both directions by means of a controllable spindle actuator (53, 48).

4. Biopsy device per claim 3, characterized in that a high-speed electric DC motor (58) with secondary planet gearing is used as actuator for the controllable spindle drive (53, 48).
5. Biopsy device per claim 4, characterized in that the transmission from the planet gearing to the plunger spindle (53) occurs via a single-stage gearing, and the threaded spindle nut (48) mounted on the syringe cylinder carries a toothed crown (55) on the outside.
6. Biopsy device per claim 1-4, characterized in that the plunger (54) for generating a vacuum in the system and in the sample removal chamber is moved in a first step from the syringe bottom (52) to just in front of the ventilation opening (67).
7. Biopsy device per claim 1-4, characterized in that, in order to ventilate the system, the plunger (54) in a second step following the first step is pulled back beyond the ventilation opening (67), and after the vacuum is dissipated it travels back again to close the ventilation borehole.
8. Biopsy device per claim 1-4, characterized in that the plunger (54) in a third step following the second step is moved in the direction of the syringe bottom (52) in order to create an excess pressure in the sample removal chamber.
9. Biopsy mechanism per claim 1, characterized in that the electric gear motor (58) of the piston/cylinder unit (69) is controlled by measuring the speed of revolution such that the plunger (54) in a first step is withdrawn from the cylinder until just before the ventilation opening (67), in a second step the ventilation borehole (67) is cleared and after the vacuum is dissipated the ventilation borehole is closed again, and in a third step it moves in opposite direction to create the excess pressure toward the syringe bottom (51), coordinated with the controlling of the sample removal and the ejecting of the sample.

10. Biopsy device per claim 1, characterized in that the speed of revolution of the DC motors is measured by a photocell permanently arranged on the motor housing and a pickup arranged on the motor shaft.
11. Biopsy device per claim 10, characterized in that the speed of revolution of the motor is compared against a nominal value previously stored in the electronics and used to trigger the control of the spindle actuation.
12. Biopsy device per claim 1, characterized in that the inner space of the hollow biopsy needle (2) is connected to the inner space of the vacuum/pressure device (5) by a connection piece (4) so that no air can flow in from outside during partial vacuum or flow out during excess pressure.
13. Biopsy device per claim 12, characterized in that the connection piece (4) is a flexible hose, arranged in direct proximity to the hand piece (1).
14. Biopsy device according to one or more of the preceding claims, characterized in that the biopsy needle carrier (37) with the round, hollow biopsy needle (2) and the cutting sheath (3), likewise round in cross section and coaxially surrounding the biopsy needle, as well as parts of the actuator, the connection element (4) and the vacuum pressure-generating device (5), form a removable interchangeable element (20), which can be inserted into the hand piece (1).
15. Biopsy device per claim 14, characterized in that the removable biopsy needle carrier (37) can be inserted into the brackets (40) of the tension slide (28) by means of the recesses (77).

16. Biopsy device per claim 1, characterized in that the tension slide (28) is placed in the cocked position by a spindle actuator (73, 75), driven by means of a DC gear motor (21) with single-stage secondary transmission (23, 74).
17. Biopsy device per claim 17, characterized in that the tension slide (28) can be mechanically locked in the cocked position.
18. Biopsy device according to one or more of claims 14-17, characterized in that a toothed roller (23) is placed on the take-off shaft of the planet transmission connected to the DC gear motor, which engages with the gear (74) of the spindle actuator (73, 75) connected to the cutting sheath (3).
19. Biopsy device per claim 18, characterized in that the gear (74) mounted on the spindle actuator (73), (75), thrusts against a holder (36) of the base block (8) during displacement of the tension slide (28).
20. Biopsy device per claim 1 and 14, characterized in that the biopsy needle (2) with coaxial cutting sheath (3) and other elements arranged thereon are held at two bearing points (75, 49) in the biopsy needle carrier (37) so that the biopsy needle (2) and/or the cutting sheath (3) can turn individually.
21. Biopsy device per claim 1 and 14, characterized in that the piston/cylinder unit (69) is designed such that a vacuum generated in the sample removal chamber (71) on the order of 200 hph is established in the system consisting primarily of the cavity/piston/cylinder unit (69), the hollow biopsy needle (2) and the hollow connection piece (4).
22. Biopsy device per claim 1 and 14, characterized in that the cross section of the biopsy needle has a narrowing (79) in front of the sample removal chamber, which covers the opening of the cross section of the sample removal chamber from above.

23. Biopsy device per claim 22, characterized in that the narrowing comprises 60-75% of the cross section and the narrowing projects into the cross section from above.
24. Biopsy device per claim 23, characterized in that the narrowing is a stopper around 10 mm in length.
25. Biopsy device per claim 1 and 14, characterized in that the narrowing is formed as a lip or dog protruding into the cross section.
26. Biopsy device per claim 1 and 14, characterized in that only around 25% of the cross section of the sample removal chamber (71) is open at the top.
27. Biopsy device per claim 20, characterized in that the threaded spindle nut (75) of the threaded spindle casing (73) is press-fitted into the biopsy needle carrier (37) and forms one of the two bearing points.
28. Biopsy device per claim 1, characterized in that a base block (8) is arranged in the center of the inner housing, serving as fastening, as well as support, bearing and holding of the individual components such as tension slide (28), biopsy needle carrier (37), vacuum pressure-generating device (3) and actuating devices (105, 106).
29. Biopsy device per claim 1, characterized in that a miniature switch (18) is integrated in the end cover (7) of the housing serving as the bearing of the vacuum/pressure device (5) at the housing, the activation of which enables the power supply.
30. Biopsy device per claim 29, characterized in that the switch pin (19) of the miniature switch (18) is activated by pressing down the vacuum pressure-generating device (5) by means of the housing cover (10).

31. Biopsy device per claim 1 and 14, characterized in that means are provided on the biopsy needle carrier (37) to prevent a closing of the housing cover (10) when the tension slide is cocked and the biopsy needle carrier is installed, or an opening of the housing cover when the housing is closed.
32. Biopsy device per claim 1, characterized in that surfaces are provided on the housing for attaching the hand piece to a positioning mechanism.
33. Biopsy device per claim 1 and 14, characterized in that the upper outer contour of the biopsy needle carrier (37) corresponds to the inner contour of the housing.
34. Biopsy device per claim 1 and 14, characterized in that a plastic part (47) with knurled disk (80) is mounted by friction locking on the right end (proximal end) of the biopsy needle (2).
35. Biopsy device per claim 1 and 14, characterized in that the plastic part (47) has a polygon (50), which interacts with the biopsy needle carrier (37) and which, when turned by means of the knurled disk (80), locks the biopsy needle (2) and thus the sample removal chamber (71) in the selected position in the biopsy needle carrier (37).
36. Biopsy device per claim 28, characterized in that the space for the gear motors is separated at the top from the other space by a cover (46) connected to the base block (8).
37. Biopsy device per claim 1 and 28, characterized in that the battery space is separated at the top by a separation plate (144) from the rest of the space.
38. Biopsy device per claim 17, characterized in that a double-arm lever (33) which can be adjusted about an axis (35) under spring pressure is used, one arm (100) of which is

39. Biopsy device per claim 1, characterized in that the functional displays and operating switches for the electronics are integrated in the board (Figure 7).
40. Biopsy device per claim 1, characterized in that the connection element (4) is connected to the biopsy needle (2) by a plastic part (112) which is able to rotate in the plastic part (47).
41. Biopsy device per claim 40, characterized in that the plastic part (112) is sealed off against the plastic part (47) by means of an O-ring.
42. Biopsy device per claim 14, characterized in that the removable element (20) is a sterile packaged unit.
43. Biopsy device per claim 14, characterized in that the biopsy needle carrier (37) and the vacuum pressure-generating device (5) are embraced by brackets (108), (118) of an insert aid and a cross piece (109) arranged on the insert aid orients the biopsy needle carrier (37) in the lengthwise axis and the vacuum pressure-generating device is oriented in the lengthwise axis by a pin (110) engaging with it.
44. Biopsy device per claim 43, characterized in that the insert aid has two holder pieces (117) on the upper side.
45. Biopsy device per claim 1, characterized in that the cutting sheath (3) is moved approximately 2 mm beyond the distal end of the sample removal chamber in the direction of the needle tip when cutting out the tissue sample.

46. Biopsy device per claim 1, characterized in that, when using a coaxial cannula for the positioning, a seal is provided at the proximal end of the coaxial cannula tube, preventing the vacuum from being dissipated when the needle is introduced.
47. Biopsy device per claim 45, characterized in that one or more spacing pieces can be inserted between the proximal bearing surface of the coaxial cannula and the distal end surface of the guide ring.